

## **ABSTRACT**

A fluorescence detection system includes a photonic band gap structure. An internal surface of the photonic band gap structure defines a core region, and is coated with a film formed of conjugated polymer molecules. The core region is filled with a sample fluid or gas having a plurality of either chemical or biological analytes dispersed therein. An optical source generates excitation light directed to the sample fluid. In response, a binding event between a bacterium or chemical species in the fluid or gas and one or more of the conjugated polymer molecules generates a fluorescent signal whose wavelength falls within the photonic band gap. The fluorescent signal is guided through said core region by resonant reflections, and is guided onto a detector. A plurality of photonic band gap structures may be combined so as to form a biosensor array.